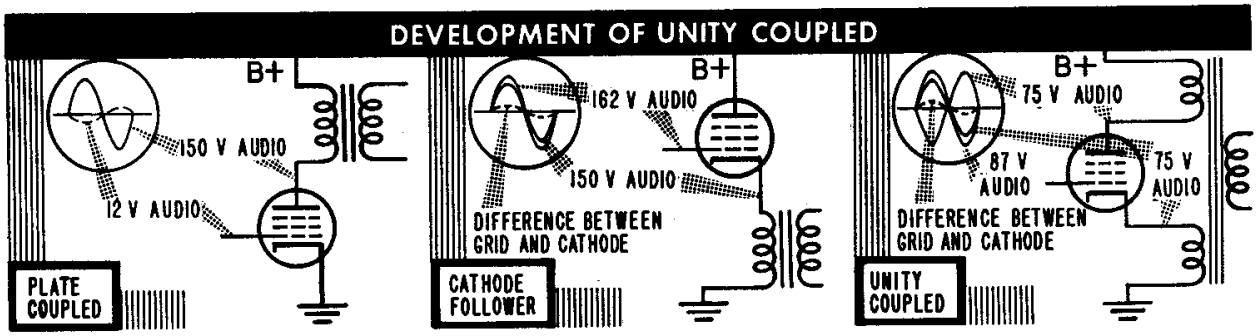
Special Output Circuits



Until feedback came along, the choice for output tubes was between triodes and pentodes. Pentode operation is much more efficient in terms of audio power output for the power input, but it is far more critical of being operated with exactly the right load resistance value than when the same tubes are triode connected.

This led to two basic variations in output circuits, although many further minor variations have developed. The first, called "unity coupled," can best be thought of as a "half-way" cathode follower. Assume that we use a pentode tube that needs a 12-volt audio input to produce a 150-volt output across the load coupled to the plate. To go wholly cathode follower would require an input *voltage* of 150 + 12 = *162 volts* to get the power represented by 150 volts across the load coupled in the cathode circuit. But by coupling the load so that the plate circuit feeds half the power and the cathode half, an audio voltage of 75 volts will appear at each. Now the input audio voltage needed is only 75 + 12 = *87 volts.*

To work as a pentode, the screen must always be at a constant voltage "above" the cathode. This can be achieved by using a multiple-wound transformer. One push-pull primary connects to the cathodes of the tubes, with its center tap to the ground. The other, of exactly equal turns, connects to the screen, with its center tap to B+. This insures that the audio voltage on the screen is the same as that on the cathode. For the plate to deliver its half of the power, it must produce an equal but opposite voltage, so the plates are "cross-connected."